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The Accuracy of Students' Novice, Apprentice, Proficient, and Distinguished Classifications for the 2004 Kentucky Core Content Tests

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The purpose of this report is to present classification accuracy statistics for the Spring 2004 administration of the Kentucky Core Content. Classification accuracy is an alternative method for considering the reliability of a test. The Kentucky Core Content Test is administered to students in 18 grade/subject combinations, identified in Table 1, plus on-demand writing and writing portfolio assessment in three grades. For scoring and reporting, each grade/subject combination is treated as a separate test. Based on the results of these tests, each student is assigned one of four basic proficiency levels: Novice, Apprentice, Proficient, or Distinguished (NAPD).[1] For the 18 grade/subject combinations listed in Table 1, scoring is a two-step process described in Kentucky Department of Education (KDE) technical manuals (KDE, 1995, 1997, 2002a). Students first receive a scale score derived from their responses to the items on the test. "Cut points" have been set in previous standard-setting studies (KDE, 2002b) which divide the scale score range into the four NADP proficiency categories. Students are assigned the NAPD level matching their scale score. The two types of writing assessments are scored holistically, assigning NAPD classifications directly. This precludes application of our classification accuracy methodology to the two writing assessments.

Table 1. Grade/Subject Combinations for the Kentucky Core Content Test Analyzed for Classification Accuarcy

	Grade					
Subject	4	5	7	8	10	11
Reading (RD)	X		X		X	
Mathematics (MA)		X		X		X
Science (SC)	X		X			X
Social Studies (SS)		X		X		X
Arts and Humanities (AH)		X		X		X
Vocational Living and Practical Studies (PL)		X		X	X	

Tests are useful when assignment accuracy to NAPD levels is high—however, no test is perfect. This report examines the accuracy of the Kentucky Core Content Test NAPD assignments for Spring 2004. The methodology for this classification accuracy analysis was developed by Hoffman and Wise (1999) and presented to Kentucky's National Technical Advisory Panel on Assessment and Accountability (NTAPAA) on two occasions (September 9-10, 1999 and December 16-17, 1999). The method was approved by the NTAPAA during the September meeting. Preliminary results for the 1999 assessments were presented during the December meeting. The present report conforms to the NTAPAA reporting specifications and uses the established methodology. The classification accuracy method was also presented to the

[1] The Novice and Apprentice categories are each further subdivided in three additional categories. Assignment to these subdivisions is not considered in this report.

National Council for Measurement in Education (NCME) at its annual meeting in April 2000. The NCME paper (Hoffman & Wise, 2000a) is available from the authors. Results for Spring 1999, 2000, 2001 and 2002 have been previously reported by Hoffman and Wise (2000b), Hoffman, Wise, and Thacker (2000), and Hoffman, (2002), and are available at www.kentuckyschools.net (search for "student classification accuracy").

Classification Accuracy

Before presenting the results, a few concepts need to be reviewed. As mentioned above, no test is perfect. What that means to the psychometrician is that an observed test score is the product of two factors: true proficiency in the knowledge area being assessed and measurement error that comes from a variety of sources. For example, a given student may be strong in some areas of mathematics and weak in others. If test content is well balanced, then the students should be able to exhibit their strengths, but the test should also expose their weaknesses, and therefore, total test scores should be close estimates of students' true proficiencies. On the other hand, if the test is out of balance, then scores may be too high or too low for some students depending on whether the content they know is over- or under-emphasized by the test.[2]

Unfortunately, students' true achievement levels can only be estimated by fallible test scores. That is, obtained scores are known, but true scores are unknown. Using test reliability statistics, however, it is possible to provide estimations that answer the following two questions:

- For a given obtained score, what are the odds that true proficiency is in the same NAPD classification?
- For that given obtained score, what are the odds that true proficiency falls into a different NAPD classification?

These two questions lead to 16 probability estimates: that is, for each of the four assigned NAPD proficiency levels, what are the odds of true proficiency at each level? These probability estimates are presented in classification accuracy tables for each grade/subject combination.

A caveat

Each Kentucky Core Content Test grade/subject assessment is composed of either 12 forms for Art and Humanities and Practical Living/Vocational Studies or 6 forms for the rest of the subjects (Reading, Mathematics, Science, and Social Studies). Because students take only one form, there is no way to determine if students would obtain the same test score if they had taken a different form. That is, differences in content coverage across test forms could lead an individual to score higher or lower on one form versus another. Given the test administration design, we simply do not have a way to estimate this type of effect.

[2] This is based on an internal consistency conception of test reliability. Other perspectives are also appropriate (e.g., retesting on different occasions), but are not considered in this report due to the constraints of test administration (e.g. students only take the test on one occasion).

Reading the Classification Accuracy Tables using Spring 2004 Grade 4 Reading, as an Example

In Table 2 and similar tables in the Appendix, numbers represent percentages of all students,[3] so that the sum of all of the italicized percents is 100 (within rounding). The "Total % Expected Correct Assignment" row at the bottom of the table indicates the percent of students who were actually assigned each of the four NAPD classifications. For example, in Table 2, 11.19% of all Grade 4 students who took the Kentucky Core Content Test in Reading received test scores that placed them in the Novice category. Likewise, 22.26% of all students received test scores within the score range for the Apprentice category; 59.06% were Proficient; and 7.49% were Distinguished. Since test scores are not perfect, some proportion of students are expected to have true achievement in categories matching their assigned categories, with the remaining students expected to have true achievement that falls in categories other than their assigned categories. The bold italicized numbers in Table 2 indicate proportions of accurate classifications. That is, 8.18% of all students are expected to be accurately classified as Novice, 14.94% of all students are expected to be accurately classified as Apprentice, 53.02% of all students are expected to be accurately classified as Proficient, and 4.56% of all students are expected to be accurately classified as Distinguished. The sum of these four percentages (80.70), labeled "Total % Expected Correct Assignments," is the percent of all students expected to be classified accurately. That is, approximately 81% of all Grade 4 students would be assigned to the same category of proficiency if we actually knew their true achievement.[4]

Table 2. Grade 4 Reading 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***8.18***	*1.58*	*0.01*	*0.00*	9.77
Apprentice	*2.96*	***14.94***	*4.51*	*0.00*	22.40
Proficient	*0.06*	*5.75*	***53.02***	*2.92*	61.74
Distinguished	*0.00*	*0.00*	*1.52*	***4.56***	6.09
Total % Assigned	11.19	22.26	59.06	7.49	100.00
Total % Expected Correct Assignments: **80.70**			Average Distribution Error: 1.41		

The numbers in Table 2 in non-bold italics indicate the proportions of students expected to have true achievement classifications that are different from their assigned classification. For example, 2.96% of all students are expected to have obtained test scores that place them in the Novice range while their true achievement would place them one category higher in the Apprentice category. Conversely, 1.58% of all students are expected to have obtained test scores that place them in the Apprentice category, while their true achievement would place them one category lower in the Novice category. Another 5.75% of all students are expected to have obtained test scores that also place them in the Apprentice category, while their true achievement would place them one category higher in the Proficient category. In total, 19.30% (100-80.70%) of all students are expected to be misclassified in Grade 4 reading in 2002.

[3] Analyses were conducted on all "non-exempted" students only, so that "all students" actually means all non-exempt students.

[4] Again, true achievement for any student is unknowable. Therefore, we cannot determine which students are accurately classified. We can only estimate the rate of accurate classification.

Student classification accuracy data also has important implications for school accountability scores. School accountability scores are a function of all students' classifications. Some of the inevitable classification error will be in one direction and some in the other. As seen in Table 2, some proportion of students are expected be classified higher than their true proficiency and some lower. The percentage of students actually assigned to a particular category versus our projections of the percent of students expected to have true achievement at that level shows that the misclassification errors tend to balance out for the total student population. For example, the last column in Table 2 shows that 22.40% of the students are expected to be Apprentice based on their unknowable true scores, while 22.26% of the students are assigned the Apprentice classification based on their test performance. The difference between these percentages is less than 1. Differences between the expected and assignment distributions for the other three categories are similarly close, with the average difference in category percentages being 1.4 Because this error refers to category total distributions, it is referred to as "Average Distribution Error" in the table.

Results tables for all grade/subjects, for 2004, are presented in the Appendix.

Summary of the Results

Table 3 shows the total expected correct assignments for all 18 grade/subject combinations for 2004, with the results for 2003 added for comparison. In 2004, student classification accuracy varies from approximately 57% (Grade 5 Practical Living/Vocational Studies) to approximately 83% (for Grade 10 Reading). As expected, the two shorter tests, AH and PL/VS have the lowest accuracy. Reading, Mathematics, and Social Studies have accuracies near 80%, with Science in the mid 70% range[5]. Accuracy rates for 2004 are similar to the previous year. Noticeable increases in accuracy can be seen in 5th and 8th grade Arts & Humanities, while Science and Social Studies in all grade levels experienced a slight decrease.

Table 3. Student Classification Accuracy: Total Percent Expected Correct Classifications

Subject	Grade	Spring 2003	Spring 2004
AH	05	62.2	67.6
AH	08	60.3	67.1
AH	11	65.3	63.9
MA	05	74.2	72.7
MA	08	80.2	80.5
MA	11	79.6	78.6
PL	05	58.8	56.8
PL	08	61.8	63.7
PL	10	61.4	63.1
RD	04	78.7	80.7
RD	07	79.9	81.5
RD	10	81.1	83.0
SC	04	76.6	74.8
SC	07	73.1	71.8
SC	11	77.2	76.8
SS	05	71.4	69.8
SS	08	79.5	79.3
SS	11	80.1	78.9

Turning from the individual level accuracy data to the distribution accuracy results, Table 4 on the following page, summarizes how well the distribution of assigned classifications matches the expected distribution of true classifications by showing the difference between expected and assigned total percentages averaged across the four

[5] These numbers must be interpreted in light of the fact that if there were to be such a thing as a perfect test, it would have to be so perfect that sufficient decimals could be computed to avoid any score falling on one of the cut points that divide categories. Otherwise, scores on the cut point could be either assigned to the higher category or to the lower with no certainty either way. In practice, a degree of inaccuracy in assigning classifications is inevitable.

Table 4. Average Category Distribution Error

Subject	Grade	Spring 2003	Spring 2004
AH	05	3.8	4.1
AH	08	3.8	2.9
AH	11	2.5	3.0
MA	05	1.0	1.4
MA	08	0.4	0.5
MA	11	0.5	0.5
PL	05	5.8	6.5
PL	08	3.8	4.1
PL	10	4.6	4.4
RD	04	1.7	1.4
RD	07	1.5	1.2
RD	10	1.1	1.3
SC	04	1.7	1.9
SC	07	1.1	1.5
SC	11	0.9	1.2
SS	05	1.5	1.8
SS	08	1.3	1.1
SS	11	1.0	1.2

achievement levels. The distributions match quite closely, with the match being closer for the subjects with greater student classification accuracy.

Perspective on the results

Test specialists are in the early stages of recognizing the need to study classification accuracy as well as more traditional measures of test reliability. Currently, investigations of classification accuracy tend to be methodological papers that focus on analytical variations of the accuracy theme. Several of these studies used operational data. For example, Rogosa (1994) examined 1993 California's CLAS assessment, which uses six proficiency levels. He found that although the probability of classification within one category of true proficiency was nearly 95%, the probability of exact classification was only 51.72%. Rogosa (2000) has presented similar findings for other assessments, including California's STAR assessment, along with a warning that classification accuracy is often not as good as we think.

In another example, Lee, Hanson, and Brennan (2000) used data from ACT's Work Keys assessment. Their results confirm that the number of proficiency categories makes a difference – more categories mean more opportunities of classification error. For a Work Keys subtest with five categories, exact accuracy for several different forms was in the 70% range, while a subtest with six categories showed accuracy in the low- to mid-60% range. Lee et al. also looked at accuracy for classifying students simply above or below a single cutpoint, using each of the possible Work Keys cutpoints to look at these dichotomous classifications. Accuracy was in the upper 80% range to near 100% for classifying students into only one of two categories. The higher levels of accuracy occurred for classification of students into either extreme. When the cutpoint was closer to the center, accuracy tended to be in the upper 80% range. Young and Yoon (1998) provide similar data from the New Standards assessments. Again, when making only a dichotomous (two-category) classification, they showed better accuracy (e.g., in the lower 90% range).

For comparison purposes, we can calculate accuracy for the Kentucky Core Content Test Grade 4 Reading assessment as if it were used to divide students into two categories created by combining Novice with Apprentice and Proficient with Distinguished. Looking at the data in Table 2 from this perspective, some of the cells that previously represented misclassification now represent accurate classification. Accuracy, therefore, becomes the sum of the four cells in the upper left plus the sum of the four cells in the lower right. The resulting "dichotomous"

accuracy of "Apprentice and below" versus "above Apprentice" is approximately 90.7% which is comparable to Work Keys and New Standards.

Given these examples, the Kentucky Core Content Test appears to have classification accuracy statistics that are similar to other educational proficiency assessments. We have also seen in this report that individual level inaccuracies tend to cancel out so that the distributions of students' scores on the aggregate level appear to be reasonably precise.

References

Hoffman, R. G. (2002). *The accuracy of students' novice, apprentice, proficient, and distinguished classification for the 2003 Kentucky Core Content Tests.* (FR-02-46). Alexandria, VA: Human Resources Research Organization. Also available at www.kentuckyschools.net

Hoffman, R. G., & Wise, L. L. (1999). *Establishing the Reliability of Student Level Classifications: Analytic Plan and Demonstration.*(FR-WATSD-99-34). Alexandria, VA: Human Resources Research Organization.

Hoffman, R. G., & Wise, L. L. (2000a). *Establishing the reliability of student proficiency* classifications*: The accuracy of observed classifications.* Paper presented at the annual meeting of the National Council of Measurement in Education, New Orleans, April, 2000. Also available at www.Humrro.org .

Hoffman, R. G., & Wise, L. L. (2000b). *The accuracy of students' novice, apprentice, proficient, and distinguished classification of the Kentucky Core Content Test for 1999.* (FR-WATSD-00-25). Alexandria, VA: Human Resources Research Organization.

Hoffman, R. G., Wise, L. L., & Thacker, A.A. (2000). *The accuracy of students' novice, apprentice, proficient, and distinguished classification of the 2000 Kentucky Core Content Test for 1999.* (FR-00-41). Alexandria, VA: Human Resources Research Organization.

Kentucky Department of Education (1995). *KIRIS Accountability Cycle 1 Technical Manual*. Frankfort, KY: Author.

Kentucky Department of Education (1997). *KIRIS Accountability Cycle 2 Technical Manual*. Frankfort, KY: Author.

Kentucky Department of Education (2002a). *Kentucky Core Content Test 2000 Technical Report*. Frankfort, KY: Author.

Kentucky Department of Education (2002b). *Kentucky's Student Performance Standards,* http://www.kde.state.ky.us/comm/pubinfo/standards/. Frankfort, KY: Author.

Lee, W., Hanson, B. A., & Brennan, R. L. (2000). *Procedures for computing classification consistency and accuracy indices with multiple categories.* Paper presented at the annual meeting of the National Council of Measurement in Education, New Orleans, April, 2000.

Rogosa, D. (2000). *Statistical topics in educational assessment: Individual scores, Group summaries, and accountability systems.* Presented to the March 14, 2000 CCSSO Technical Issues in Large Scale Assessment Workshop, San Diego, California.

Rogosa, D. (1994). Misclassification in student performance levels. In CTB/McGraw-Hill. (1994). *1994 CLAS Assessment Technical Report.* Monterrey, CA: Author.

Young, M. J. & Yoon, B. (1998). *Estimating the Consistency and Accuracy of Classifications in a Standards-Referenced Assessment.* (CSE Technical Report 475). Los Angeles: Center for the Study of Evaluation, National Center for Research on Evaluation, Standards, and Student Testing, Graduate School of Education & Information Studies, University of California, Los Angeles.

Appendix

Classification Accuracy Tables for Spring 2004

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Table A-1. Grade 5 Arts & Humanities 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***16.90***	*5.50*	*0.07*	*0.00*	22.48
Apprentice	*9.76*	***41.08***	*8.46*	*0.43*	59.74
Proficient	*0.12*	*4.88*	***8.13***	*2.78*	15.90
Distinguished	*0.00*	*0.07*	*0.37*	***1.45***	1.88
Total % Assigned	26.79	51.53	17.02	4.65	100.00
Total % Expected Correct Assignments: **67.56** Average Distribution Error: 4.10					

Table A-2. Grade 8 Arts & Humanities 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***15.47***	*4.13*	*0.27*	*0.00*	19.88
Apprentice	*7.30*	***21.01***	*8.39*	*0.04*	36.75
Proficient	*0.38*	*7.45*	***27.16***	*3.71*	38.71
Distinguished	*0.00*	*0.03*	*1.15*	***3.49***	4.67
Total % Assigned	23.15	32.63	36.97	7.25	100.00
Total % Expected Correct Assignments: **67.12** Average Distribution Error: 2.93					

Table A-3. Grade 11 Arts & Humanities 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***16.57***	*4.25*	*0.20*	*0.01*	21.02
Apprentice	*7.24*	***23.79***	*7.41*	*1.04*	39.47
Proficient	*0.27*	*6.48*	***11.87***	*5.49*	24.11
Distinguished	*0.01*	*0.55*	*3.12*	***11.71***	15.39
Total % Assigned	24.08	35.06	22.61	18.24	100.00
Total % Expected Correct Assignments: **63.93** Average Distribution Error: 2.96					

Table A-4. Grade 5 Mathematics 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***17.88***	*3.59*	*0.06*	*0.00*	21.54
Apprentice	*4.95*	***19.15***	*5.54*	*0.00*	29.64
Proficient	*0.11*	*6.25*	***27.24***	*4.12*	37.72
Distinguished	*0.00*	*0.05*	*2.64*	***8.41***	11.10
Total % Assigned	22.95	29.04	35.48	12.53	100.00
Total % Expected Correct Assignments: **72.68** Average Distribution Error: 1.42					

Table A-5. Grade 8 Mathematics 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***21.87***	*3.61*	*0.00*	*0.00*	25.49
Apprentice	*3.95*	***33.81***	*4.36*	*0.00*	42.12
Proficient	*0.00*	*3.62*	***18.99***	*2.25*	24.86
Distinguished	*0.00*	*0.01*	*1.74*	***5.79***	7.54
Total % Assigned	25.82	41.05	25.10	8.03	100.00
Total % Expected Correct Assignments: **80.46** Average Distribution Error: 0.54					

Table A-6. Grade 11 Mathematics 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***27.68***	*4.90*	*0.05*	*0.00*	32.63
Apprentice	*4.06*	***23.32***	*4.38*	*0.01*	31.77
Proficient	*0.00*	*3.49*	***17.35***	*2.71*	23.55
Distinguished	*0.00*	*0.00*	*1.82*	***10.22***	12.05
Total % Assigned	31.74	31.72	23.61	12.94	100.00
Total % Expected Correct Assignments: **78.57** Average Distribution Error: 0.48					

Table A-7. Grade 5 Practical Living/Vocational Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***6.88***	*2.22*	*0.44*	*0.01*	9.55
Apprentice	*6.68*	***13.67***	*8.47*	*0.35*	29.17
Proficient	*1.85*	*10.76*	***29.82***	*9.57*	52.00
Distinguished	*0.06*	*0.34*	*2.49*	***6.39***	9.28
Total % Assigned	15.46	27.00	41.22	16.32	100.00
Total % Expected Correct Assignments: **56.77** Average Distribution Error: 6.48					

Table A-8. Grade 8 Practical Living/Vocational Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***12.17***	*3.74*	*0.11*	*0.00*	16.02
Apprentice	*7.44*	***29.47***	*9.12*	*0.29*	46.32
Proficient	*0.33*	*8.14*	***17.76***	*5.54*	31.76
Distinguished	*0.01*	*0.16*	*1.48*	***4.26***	5.90
Total % Assigned	19.94	41.50	28.48	10.09	100.00
Total % Expected Correct Assignments: **63.65** Average Distribution Error: 4.05					

Table A-9. Grade 10 Practical Living/Vocational Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***9.39***	*2.67*	*0.29*	*0.00*	12.35
Apprentice	*6.51*	***17.05***	*8.12*	*0.12*	31.80
Proficient	*0.78*	*9.14*	***30.32***	*6.83*	47.07
Distinguished	*0.01*	*0.12*	*2.34*	***6.31***	8.78
Total % Assigned	*16.69*	*28.99*	*41.07*	*13.25*	100.00
Total % Expected Correct Assignments: **63.07** Average Distribution Error: 4.41					

Table A-10. Grade 4 Reading 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***8.18***	*1.58*	*0.01*	*0.00*	9.77
Apprentice	*2.96*	***14.94***	*4.51*	*0.00*	22.40
Proficient	*0.06*	*5.75*	***53.02***	*2.92*	61.74
Distinguished	*0.00*	*0.00*	*1.52*	***4.56***	6.09
Total % Assigned	11.19	22.26	59.06	7.49	100.00
Total % Expected Correct Assignments: **80.70** Average Distribution Error: 1.41					

Table A-11. Grade 7 Reading 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***5.82***	*1.16*	*0.00*	*0.00*	6.98
Apprentice	*2.40*	***24.59***	*5.28*	*0.00*	32.28
Proficient	*0.00*	*6.38*	*46.66*	*2.22*	55.27
Distinguished	*0.00*	*0.00*	*1.08*	***4.39***	5.47
Total % Assigned	8.23	32.14	53.02	6.61	100.00
Total % Expected Correct Assignments: **81.47** Average Distribution Error: 1.19					

Table A-12. Grade 10 Reading 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***11.50***	*1.63*	*0.00*	*0.00*	13.13
Apprentice	*2.91*	***46.44***	*4.55*	*0.01*	53.90
Proficient	*0.00*	*3.85*	***16.99***	*2.65*	23.49
Distinguished	*0.00*	*0.00*	*1.41*	***8.07***	9.48
Total % Assigned	14.41	51.93	22.94	10.72	100.00
Total % Expected Correct Assignments: **82.99** Average Distribution Error: 1.27					

Table A-13. Grade 4 Science 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***4.21***	*1.04*	*0.00*	*0.00*	5.25
Apprentice	*2.71*	***30.18***	*6.26*	*0.01*	39.16
Proficient	*0.00*	*7.07*	***31.63***	*5.09*	43.79
Distinguished	*0.00*	*0.02*	*3.00*	***8.78***	11.80
Total % Assigned	6.92	38.31	40.89	13.89	100.00
Total % Expected Correct Assignments: **74.80** Average Distribution Error: 1.88					

Table A-14. Grade 7 Science 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***18.45***	*3.80*	*0.03*	*0.00*	22.28
Apprentice	*5.11*	***26.19***	*6.21*	*0.10*	37.61
Proficient	*0.03*	*5.76*	***17.06***	*4.35*	27.20
Distinguished	*0.00*	*0.09*	*2.71*	***10.11***	12.91
Total % Assigned	23.59	35.85	26.01	14.55	100.00
Total % Expected Correct Assignments: **71.80** Average Distribution Error: 1.47					

Table A-15. Grade 11 Science 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	*19.03*	*4.42*	*0.02*	*0.00*	23.48
Apprentice	*4.94*	***31.33***	*6.62*	*0.00*	42.88
Proficient	*0.01*	*4.84*	***24.30***	*1.60*	30.75
Distinguished	*0.00*	*0.00*	*0.75*	***2.14***	2.89
Total % Assigned	23.97	40.59	31.70	3.74	100.00
Total % Expected Correct Assignments: **76.80** Average Distribution Error: 1.15					

Table A-16. Grade 5 Social Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***15.19***	*3.40*	*0.24*	*0.00*	18.82
Apprentice	*5.08*	***13.42***	*6.02*	*0.01*	24.53
Proficient	*0.45*	*6.90*	***30.66***	*4.93*	42.94
Distinguished	*0.00*	*0.03*	*3.18*	***10.49***	13.70
Total % Assigned	20.72	23.74	40.10	15.43	100.00
Total % Expected Correct Assignments: **69.76** Average Distribution Error: 1.81					

Table A-17. Grade 8 Social Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***13.12***	*2.52*	*0.00*	*0.00*	15.64
Apprentice	*3.76*	***36.62***	*5.21*	*0.00*	45.60
Proficient	*0.00*	*5.18*	***22.79***	*2.52*	30.49
Distinguished	*0.00*	*0.00*	*1.48*	***6.78***	8.26
Total % Assigned	16.88	44.33	29.49	9.29	100.00
Total % Expected Correct Assignments: **79.31** Average Distribution Error: 1.14					

Table A-18. Grade 11 Social Studies 2004
Percentages of True Scores Being in Assigned Classification

	Assigned Classification				Total %
True Class	Novice	Apprentice	Proficient	Disting.	Expected
Novice	***14.93***	*2.71*	*0.00*	*0.00*	17.64
Apprentice	*3.44*	***39.90***	*5.50*	*0.07*	48.90
Proficient	*0.00*	*4.18*	***14.22***	*3.42*	21.81
Distinguished	*0.00*	*0.04*	*1.74*	***9.87***	11.64
Total % Assigned	18.36	46.83	21.46	13.35	100.00
Total % Expected Correct Assignments: **78.92** Average Distribution Error: 1.22					